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Corporate Environment, Safety & Health
West Coast Projects Office
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SFUND RECORDS CTR
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Via Federal Express
CAY0399/143
WBS# 48720

March 29, 1999

Mr. Gerard J. Thibeault
Executive Officer
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3339

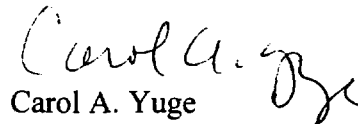
**Subject: February 1999 Data Report
Water Supply Contingency Plan
Production Well Sampling Program
Crafton-Redlands Plume Project**

Dear Mr. Thibeault:

In compliance with the approved Water Supply Contingency Plan, enclosed please find one copy of the **February 1999, Production Well Sampling Program** report prepared by HSI-Geotrans for the Lockheed Martin Corporation. This report presents analytical results from samples collected at Bunker Hill Basin Production Wells in January of 1999. Laboratory Quality Assurance/Quality Control documentation is in Attachment C which is also enclosed for your review.

Should you have any questions, comments, or requests, please contact Tom Blackman at (818) 847-0791 or John Hemmans at (818) 847-0191.

Sincerely,


Carol A. Yuge
Director

Enclosures

cc: See Attached Distribution List

Gerard Thibeault

March 29, 1999

CAY0399/143

Page 2

Distribution:

cc: (Abbreviated Report Without Attachments "A, B, & C" Which are Available Upon Request)

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HSI GEOTRANS

A TETRA TECH COMPANY

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March 26, 1999

Lockheed Martin Corporation
West Coast Project Office
2550 N. Hollywood Way, 3rd Floor
Burbank, California 91505

Attention: Mr. John Hemmans
Project Coordinator

Subject: February 1999 Data Report
Water Supply Contingency Plan
Production Well Sampling Program
Crafton-Redlands Plume Project

Dear Mr. Hemmans:

This report presents a summary of field procedures, protocols, and results of the Water Supply Contingency Plan production well sampling for the month of February 1999. The Water Supply Contingency Plan (WSCP) was prepared by Lockheed Martin Corporation and submitted to the State of California Regional Water Quality Control Board (RWQCB) Santa Ana Region on September 30, 1996. The plan was conditionally approved by the RWQCB in a letter dated March 6, 1997. The WSCP for the Crafton-Redlands Plume was prepared to address maintenance of water supply to purveyors in the event that wells became impacted with trichloroethene (TCE) from the Crafton-Redlands TCE Plume. A summary of key dates and WSCP sampling program evolution is provided on Table 1.

The locations of the WSCP wells and analytical results for the February 1999 sampling event for TCE and perchlorate are shown on Figures 1 and 2, respectively. Table 2 presents a summary of analytical tests performed on each WSCP well and water system sampling points. The sampling frequency of each well is once a month for the first year. More frequent sampling, if required, is based on the analytical results as outlined in the WSCP TCE and perchlorate decision matrices, provided as Figures 3 and 4, respectively. The perchlorate decision matrix was presented in the *Perchlorate Work Plan and Schedule*, which was submitted, to the RWQCB on August 15, 1997. The RWQCB approved the Perchlorate Work Plan on October 31, 1997. Table 3 presents a summary of the wells sampled twice monthly according to the decision matrices.

RESULTS

A summary of the analytical results for the February 1999 WSCP sampling event for TCE and perchlorate is shown on Figures 1 and 2, respectively, and presented on Table 4. Available groundwater elevation data is provided on Table 5. Chain-of-custody and laboratory data sheets are in Attachment B and Level III QA/QC documentation is in Attachment C. Attachments A, B, and C are available upon request. During the month of February all 15 of the City of Riverside Gage wells were off-line, thus these wells and the Gage Delivery system sampling point, and the Gage Arlington irrigation sampling point were not sampled.

Trichloroethene

Trichloroethene was detected at or above the detection limit of 0.5 µg/L in one well and one water system sampling point including; COLL Richardson #2 (2.1 µg/L), and Iowa Booster (0.58 µg/L) as shown on Figure 1 and Table 4. Groundwater samples collected from the remaining WSCP wells and system sampling point did not detect TCE.

One groundwater sample collected in February met or exceeded the MCL for TCE of 5.0 µg/L or 2/5th the MCL for TCE (2.0 µg/L). Trichloroethene was detected in COLL Richardson #2 at 2.1 µg/L. In accordance with the TCE Decision Matrix a confirmation sample was collected from COLL Richardson #2 on February 24, 1999. The TCE confirmation sampling results were 1.3 µg/L and 1.4 µg/L for Richardson #2 and the duplicate (MUN-731), respectively. Exceedence of 2/5th the MCL for TCE (2.0 µg/L) was not confirmed, thus twice monthly sampling of Richardson #2 for TCE will not be implemented at this time.

Perchlorate

In February 1999, perchlorate was detected at or above the detection limit of 4 µg/L in three COLL wells (Mountain View #2, Richardson #1, and Richardson #2), and two COLL water system sampling points (Mountain View Blend at Lawton and Mountain View Blend at Timoteo), as presented on Figure 2 and Table 4.

In the February WSCP sampling, perchlorate was detected at or above 75 percent (13.5 µg/L) of the PAL in one well (COLL Richardson #2). The monthly sample collected from COLL Richardson #2 on February 2, 1999 detected perchlorate at a concentration (36 µg/L) that exceeded the PAL.

To evaluate the variances in perchlorate concentration which has been observed in Richardson #2, a four-day time series sampling test was conducted. The test was conducted between February 24, and 28, 1999. The purpose of the test was to evaluate the rate of reduction or attenuation of perchlorate observed in this well

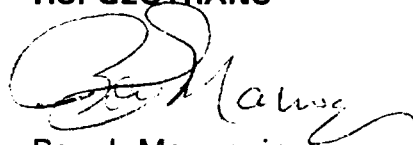
over time after the well is turned on. A total of 21 samples were analyzed over the four-day test. Perchlorate concentrations ranged from 46 µg/L at the beginning of the test and reduced to 6.4 µg/L at the conclusion of the 96-hour test. The lowest perchlorate concentration (5.2 µg/L) was observed after 40 hours of continuous pumping. A summary of the time-series attenuation test results is presented on Table 6. These collected data constitute the confirmation sampling required by the perchlorate decision matrix for the February 2, 1999 sampling results of Richardson #2.

Given the perchlorate attenuation profile in Richardson #2, Lockheed Martin is working to support the COLL as a blending plan is being developed for the consideration and approval of the DHS. Since regular use of the well appears effective in maintaining concentrations of perchlorate below 75 percent of the PAL (13.5 µg/L), twice monthly sampling will not be implemented at this time.

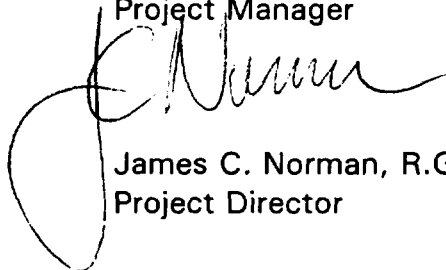
CLOSING

HSI GeoTrans greatly appreciates being of continued service to Lockheed Martin Corporation on this project. Should you have any questions or comments, please do not hesitate to call.

Sincerely,
HSI GEOTRANS



Roy J. Marroquin
Project Manager



James C. Norman, R.G., C.HG.
Project Director

TABLES

TABLE 1

KEY PROJECT DATES AND WSCP SAMPLING PROGRAM EVOLUTION

September 30, 1996, Lockheed Martin submitted the Water Supply Contingency Plan (WSCP) to the RWQCB – Santa Ana Region.
March 6, 1997, the RWQCB conditionally approved the WSCP, which included sampling eight production wells (City of Loma Linda Richardson #1, Richardson #2, Mountain View #1, Mountain View #2, Victoria Farms Mutual Water Company Wells #1 and #3, and Southern California Edison #1 and #2).
June 1997, Victoria Farms Mutual Water Company was connected to City of San Bernardino Water. Pumping ceased at VFMWC #1 and #3, and the two wells were removed from the program.
June 1997, sampling of SCE #1 was discontinued due to sampling logistics. The WSCP consists of five wells, including COLL Mountain View #1 and #2, COLL Richardson #1 and #2, and SCE #2 (AUX).
August 1997, the WSCP was expanded due to the detection of perchlorate in municipal supply wells in the Bunker Hill Basin. Twenty-six wells were added to the WSCP including nineteen City of Riverside wells, five City of Redlands wells, and two Loma Linda University wells, for a total of 31 wells.
October 1997, three City of Riverside water system sampling points were added to the WSCP, including the Gage system pipeline (Gage Delivery), the Waterman system pipeline (Iowa Booster), and the sampling station measuring outflow from the Linden and Evans Reservoirs (7 th & Chicago).
March 1998, two City of Loma Linda water system sampling points were added to the WSCP, including the Mountain View system pipeline (Mountain View Blend at Lawton) and the Richardson system pipeline (Richardson Blend).
June 1998, one City of Riverside irrigation water system sampling point (Gage Arlington) and one additional City of Loma Linda water system sampling point (Mountain View Blend at Timoteo) were added to the WSCP.
December 1998, COLL Richardson #3 Well Added to WSCP Sampling Program.

TABLE 2

WSCP PRODUCTION WELL SAMPLING PROGRAM

HSI#	Well Name	Perchlorate	TCE
City of Loma Linda			
692	Mountain View #2	X	X
693	Richardson #1	X	X
694	Richardson #2	X	X
707	Richardson #3	X	X
City of Loma Linda Water System Sampling Points			
2967	Mountain View Blend - Lawton	X	X
3016	Mountain View - Timoteo	X	X
2968	Richardson Blend	X	X
Southern California Edison			
554	SCE#2(AUX)	X	X
Loma Linda University			
267	LLUniv Anderson #2	X	
717	LLUniv Anderson #3	X	
City of Riverside (Gage System)			
252	Gage#26-1	X	X
258	Gage#27-1	X	X
259	Gage#27-2	X	X
260	Gage#29-1	X	X
219	Gage#29-2	X	X
220	Gage#29-3	X	X
218	Gage#30-1	X	X
214	Gage#31-1	X	X
215	Gage#46-1	X	X
253	Gage#51-1	X	X
216	Gage#56-1	X	X
257	Gage#66-1	X	X
644	Gage#92-1	X	X
641	Gage#92-2	X	X
642	Gage#92-3	X	X
City of Riverside (Waterman System)			
273	Hunt#6	X	
271	Hunt#10	X	
272	Hunt#11	X	
City of Riverside Water System Sampling Points			
2946	Iowa Booster (Waterman)	X	X
2947	Gage Delivery (Gage)	X	X
2948	7th & Chicago (Reservoir)	X	X
3018	Gage Arlington	X	X
City of Redlands			
542	COR Church St	X	
2673	COR#38	X	
535	COR Mentone Acres	X	
29	COR Orange st	X	
74	CORRees	X	X

Notes:

TCE = Trichloroethene

Perchlorate analyzed using DHS Method (EPA 300.0 Modified)

TCE analyzed using EPA Method 502.2

TABLE 3

**WSCP PRODUCTION WELL SAMPLING PROGRAM
FEBRUARY 1999 WELLS SAMPLED TWICE MONTHLY**

HSI#	Well Name	Perchlorate	TCE
City of Loma Linda			
692	Mountain View #2	X	
City of Riverside (Gage System)			
219	Gage #29-2	X	
220	Gage #29-3	X	

Notes:

TCE = Trichloroethene

Perchlorate analyzed using DHS Method (EPA 300.0 Modified).

TCE analyzed using EPA Method 502.2.

In February, Gage 29-2 and Gage 29-3 were not sampled because the wells were off-line.

TABLE 4
WSCP PRODUCTION WELL SAMPLING PROGRAM
FEBRUARY 1999 DATA RESULTS

HSI#	Well Name	Sample Date	Perchlorate (ppb) Del Mar	TCE (ppb) Del Mar
City of Loma Linda				
692	Mountain View #2	2/2/99	4.8	ND(0.5)
692	MUN-729	2/2/99	4.7	ND(0.5)
692	Mountain View #2*	2/16/99	5.1	NA
692	MUN-730	2/16/99	5.1	NA
693	Richardson #1	2/2/99	11	ND(0.5)
694	Richardson #2	2/2/99	36	2.1
694	Richardson #2	2/24/99	See Table 6	1.3
694	MUN-731	2/24/99	NA	1.4
707	Richardson #3	2/2/99	ND(4)	ND(0.5)
City of Loma Linda Water System Sampling Points				
2967	Mountain View Blend-Lawton	2/2/99	7.3	ND(0.5)
3016	Mountain View Blend-Timoteo	2/2/99	5.3	ND(0.5)
2968	Richardson Blend	2/2/99	ND(4)	ND(0.5)
Southern California Edison				
554	SCE#2(AUX)	2/1/99	ND(4)	ND(0.5)
Loma Linda University				
267	LLUniv Anderson #2	NS	NS	NS
717	LLUniv Anderson #3	NS	NS	NS
City of Riverside (Gage System)				
252	Gage#26-1	NS	NS	NS
258	Gage#27-1	NS	NS	NS
259	Gage#27-2	NS	NS	NS
260	Gage#29-1	NS	NS	NS
219	Gage#29-2	NS	NS	NS
219	Gage 29-2*	NS	NS	NS
220	Gage#29-3	NS	NS	NS
220	Gage#29-3*	NS	NS	NS
218	Gage#30-1	NS	NS	NS
214	Gage#31-1	NS	NS	NS
215	Gage#46-1	NS	NS	NS
253	Gage#51-1	NS	NS	NS
216	Gage#56-1	NS	NS	NS
257	Gage#66-1	NS	NS	NS
644	Gage#92-1	NS	NS	NS
641	Gage#92-2	NS	NS	NS
642	Gage#92-3	NS	NS	NS
City of Riverside (Waterman System)				
273	Hunt#6	NS	NS	NA
271	Hunt#10	NS	NS	NA
272	Hunt#11	NS	NS	NA
City of Riverside Water System Sampling Points				
2946	Iowa Booster (Waterman)	2/16/99	ND(4)	0.58
2947	Gage Delivery (Gage)	NS	NS	NS
2948	7th & Chicago (Reservoir)	2/16/99	ND(4)	ND(0.5)
3018	Gage Arlington	NS	NS	NS
City of Redlands				
542	COR Church St ^a	NS	NS	NA
2673	COR#38 ^a	NS	NS	NA
535	COR Mentone Acres ^a	NS	NS	NA
29	COR Orange St ^a	NS	NS	NA
74	COR Rees	NS	NS	NS

Notes:

- * = Twice-monthly sampling result
- = Well sampled on quarterly basis, if active
- ND(4) = Not detected at the specified limit
- MUN = Duplicate sample collected from the well listed directly above

TCE = Trichloroethene
 DEL MAR = Del Mar Analytical Laboratory of Irvine, CA
 Perchlorate analyzed using DHS Method (EPA 300.0 Modified)
 TCE analyzed using EPA Method 502.2

TABLE 5

**SUMMARY OF WATER LEVEL MEASUREMENTS
FEBRUARY 1999 SAMPLING EVENT**

HSI#	Well Name	Measure Date	Depth to Water	Measuring Point Elevation	Groundwater Elevation	Comments
CITY OF LOMA LINDA						
692	Mountain View #2	02/02/99	148	1085	937	Pumping
693	Richardson #1	02/02/99	120	1077	957	Pumping
694	Richardson #2	02/02/99	97	1078	981	Static
707	Richardson #3	02/02/99	116	NA	NA	Static
Southern California Edison						
554	SCE#2(AUX)	NM	NM	1100.00	NM	Pumping
Loma Linda University						
267	LLUniv Anderson #2	NM	NM	1075	NM	Pumping
717	LLUniv Anderson #3	NM	NM	1070	NM	Pumping
City of Riverside (Gage System)						
252	Gage#26-1	02/02/99	60.00	1045.33	985.33	Static
258	Gage#27-1	02/02/99	59.60	1044.64	985.04	Static
259	Gage#27-2	02/02/99	60.20	1044.64	984.44	Static
260	Gage#29-1	02/02/99	60.10	1044.43	984.33	Static
219	Gage#29-2	02/02/99	56.90	1046.31	989.41	Static
220	Gage#29-3	02/02/99	58.90	1048.75	989.85	Static
218	Gage#30-1	02/02/99	66.20	1054.17	987.97	Static
214	Gage#31-1	02/02/99	62.70	1054.64	991.94	Static
215	Gage#46-1	02/02/99	69.20	1065.50	996.30	Static
253	Gage#51-1	02/02/99	59.20	1044.64	985.44	Static
216	Gage#56-1	02/02/99	82.50	1065.50	983.00	Static
257	Gage#66-1	02/02/99	60.30	1044.85	984.55	Static
644	Gage#92-1	02/02/99	71.10	1047.78	976.68	Static
641	Gage#92-2	02/02/99	75.50	1053.38	977.88	Static
642	Gage#92-3	02/02/99	80.40	1058.78	978.38	Static
City of Riverside (Waterman System)						
273	Hunt#6	NM	NM	1015.5	NM	Pumping
271	Hunt#10	NM	NM	1017	NM	Pumping
272	Hunt#11	NM	NM	1015.7	NM	Pumping
City of Redlands						
542	COR Church St	Feb-99	90.0	1344.8	1254.8	Static
2673	COR#38	Feb-99	38.0	NA	NA	Static
535	COR Mentone Acres	Feb-99	142.0	1506.4	1364.4	Static
29	COR Orange st	Feb-99	123.0	1282	1159.0	Static
74	COR Rees	Feb-99	180.0	1490	1310.0	Static

Notes:

All measurements reported in feet below measuring point (ft-bmp)

Water level measurements for all City of Loma Linda, City of Riverside, and City of Redlands wells were obtained by purveyor personnel.

Elevations given in feet above mean sea level (ft-msl)

NM=Not measured

NA=Data not available

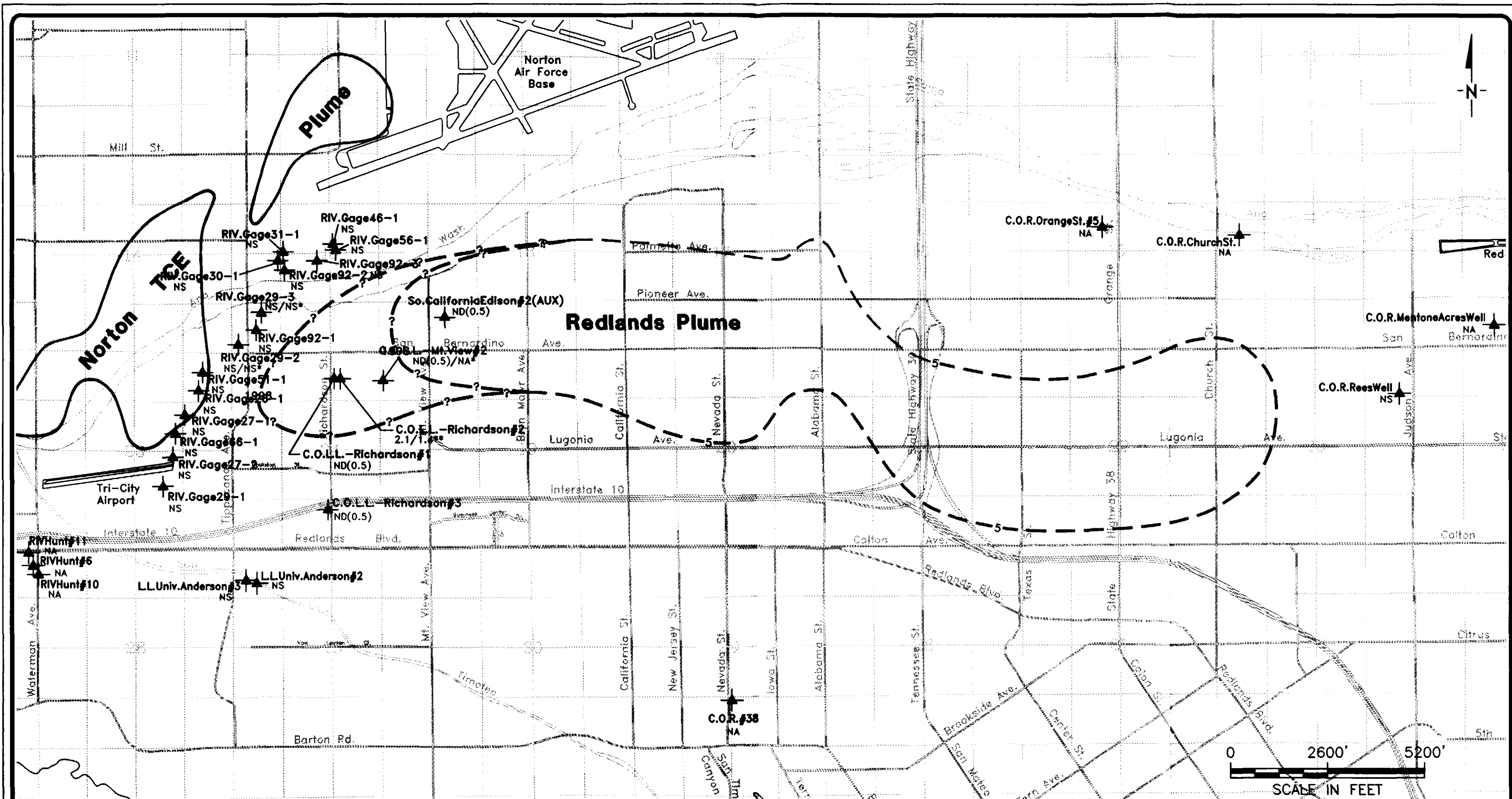
Static water levels were allowed to recover a minimum of 30 minutes to obtain a static water level measurement

TABLE 6

RICHARDSON #2 TIME-SERIES ATTENUATION TEST RESULTS

Sample Date/Time	Perchlorate Concentration ($\mu\text{g/L}$)	Time Since Test Began (hours)
2/24/99 7:00	46	0
2/24/99 8:00	22	1
2/24/99 9:00	16	2
2/24/99 10:00	13	3
2/24/99 11:00	12	4
2/24/99 12:00	11	5
2/24/99 13:00	9.7	6
2/24/99 15:00	9.2	8
2/24/99 17:00	9.7	10
2/24/99 19:00	8.2	12
2/24/99 23:00	6.9	16
2/25/99 3:00	6.5	20
2/25/99 7:00	6.2	24
2/25/99 13:00	5.8	30
2/25/99 19:00	5.3	36
2/25/99 23:00	5.2	40
2/26/99 7:00	5.3	48
2/26/99 13:00	5.3	54
2/27/99 7:00	6.5	72
2/27/99 15:00	6	80
2/28/99 7:00	6.4	96

FIGURES



EXPLANATION

Wells Currently Sampled Under the Existing WSCP Sampling Program

2.1 TCE Results ($\mu\text{g/L}$)

- Approximate TCE Plume Location 5 $\mu\text{g/L}$ (1998 interpretation of Redlands Plume)
- Approximate TCE Plume Location 5 $\mu\text{g/L}$ (1998 interpretation of Norton AFB Plume, by Norton)
- Project 5 $\mu\text{g/L}$ TCE Contour in Hydrostratigraphic Unit 2
- Project 5 $\mu\text{g/L}$ TCE Contour in Hydrostratigraphic Unit 4

- ND(0.5) Not Detected at Indicated Detection Limit
- NS Not Sampled
- NA Not Analyzed
- * Twice-Monthly Sampling Results
- ** Confirmation Sampling Result

- ND(0.5) C.O.L.L. Mountain View Blend at Lawton
- ND(0.5) C.O.L.L. Mountain View Blend at Timoteo
- ND(0.5) C.O.L.L. Richardson Blend
- 0.58 Riv. Iowa Booster (Waterman)
- NS Riv. Gage Delivery (Gage)
- ND(0.5) Riv. 7th + Chicago (Reservoir)
- NS Gage Arlington

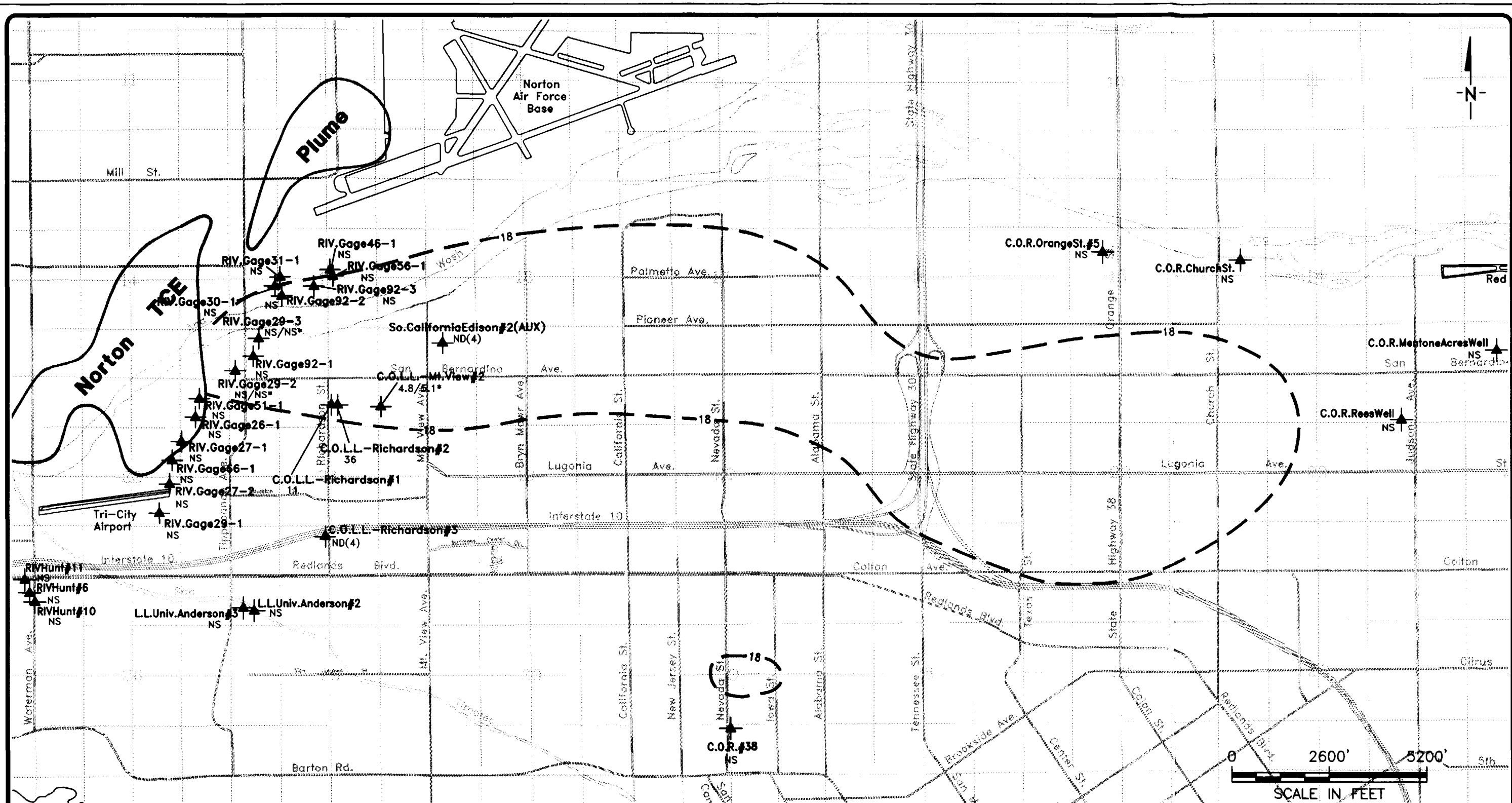
TITLE: WSCP Production Well Sampling Program
TCE Data Results February 1999

LOCATION: LOCKHEED MARTIN
REDLANDS, CALIFORNIA



CHECKED: Roy Marroquin
DRAFTED: Hector Magaña
PROJ.: C541-101
DATE: 02/25/99

FIGURE:
1



EXPLANATION

- Wells Currently Sampled Under the Existing WSCP Sampling Program
- Approximate 18 µg/L Perchlorate Plume Location (1998 Interpretation)
- Approximate TCE Plume Location 5 µg/L (1998 Interpretation of Norton AFB Plume, by Norton)

7.3 Perchlorate (µg/L) Results

- ND(4) Not Detected at Indicated Detection Limit
- NS Not Sampled
- * Twice-Monthly Sampling Results

- 5.3 C.O.L.L. Mountain View Blend - Timoteo
- 7.3 C.O.L.L. Mountain View Blend - Lawton
- ND(4) C.O.L.L. Richardson Blend
- ND(4) Riv. Iowa Booster (Waterman)
- NS Riv. Gage Delivery (Gage)
- ND(4) Riv. 7th + Chicago (Reservoir)
- NS Gage Arlington

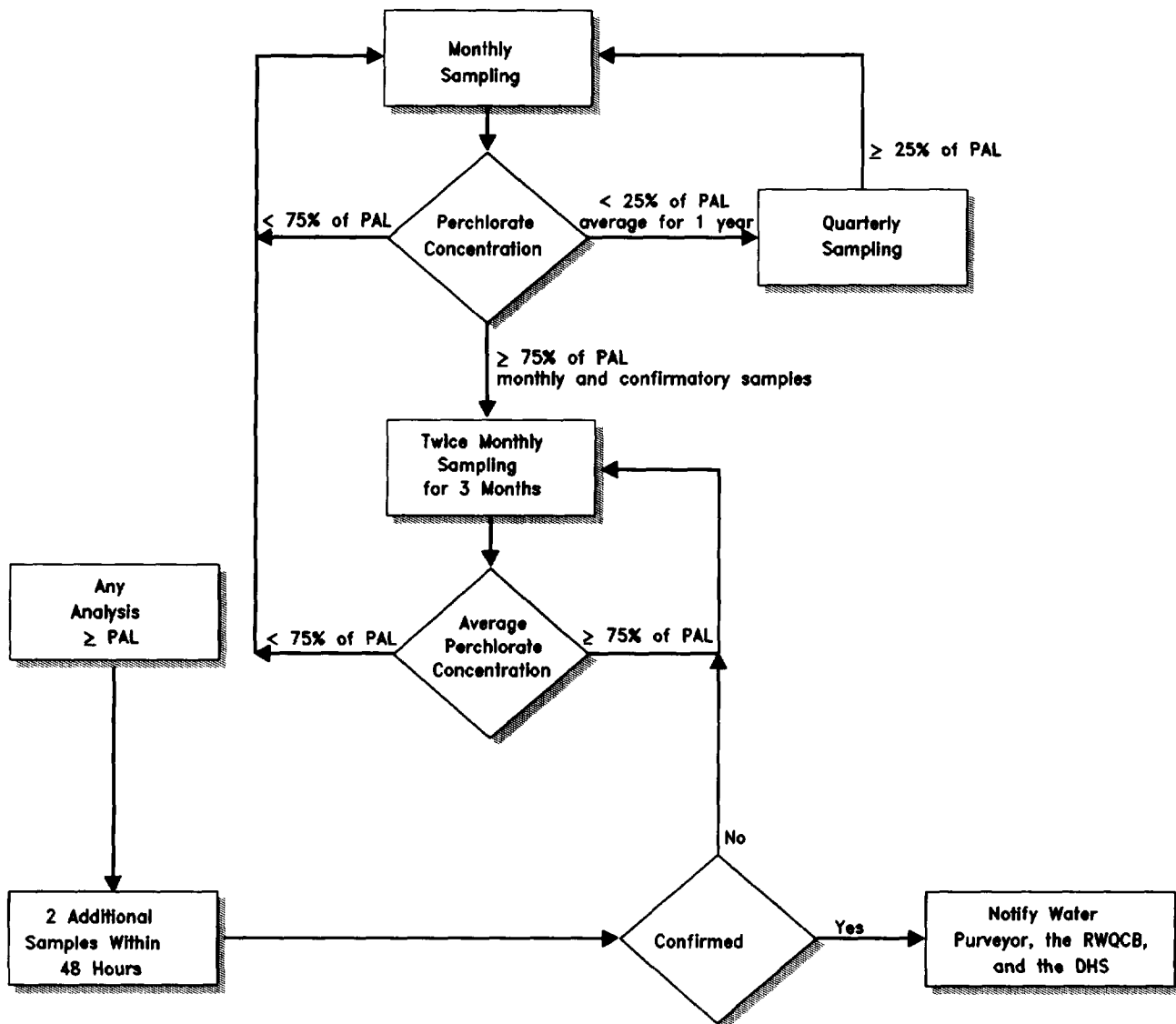
TITLE: WSCP Production Well Sampling Program
Perchlorate Data Results February 1999

LOCATION: LOCKHEED MARTIN
REDLANDS, CALIFORNIA



CHECKED: Roy Marroquin
DRAFTED: Hector Magaña
PROJ.: C541-101
DATE: 02/25/99

FIGURE:
2



Footnote:

Perchlorate Provisional Action Level (PAL) = 18 $\mu\text{g/L}$ (California Department of Health Services, May 1997)

TITLE: Decision Matrix for Sampling
Production Wells for Perchlorate

LOCATION: LOCKHEED MARTIN
REDLANDS, CALIFORNIA

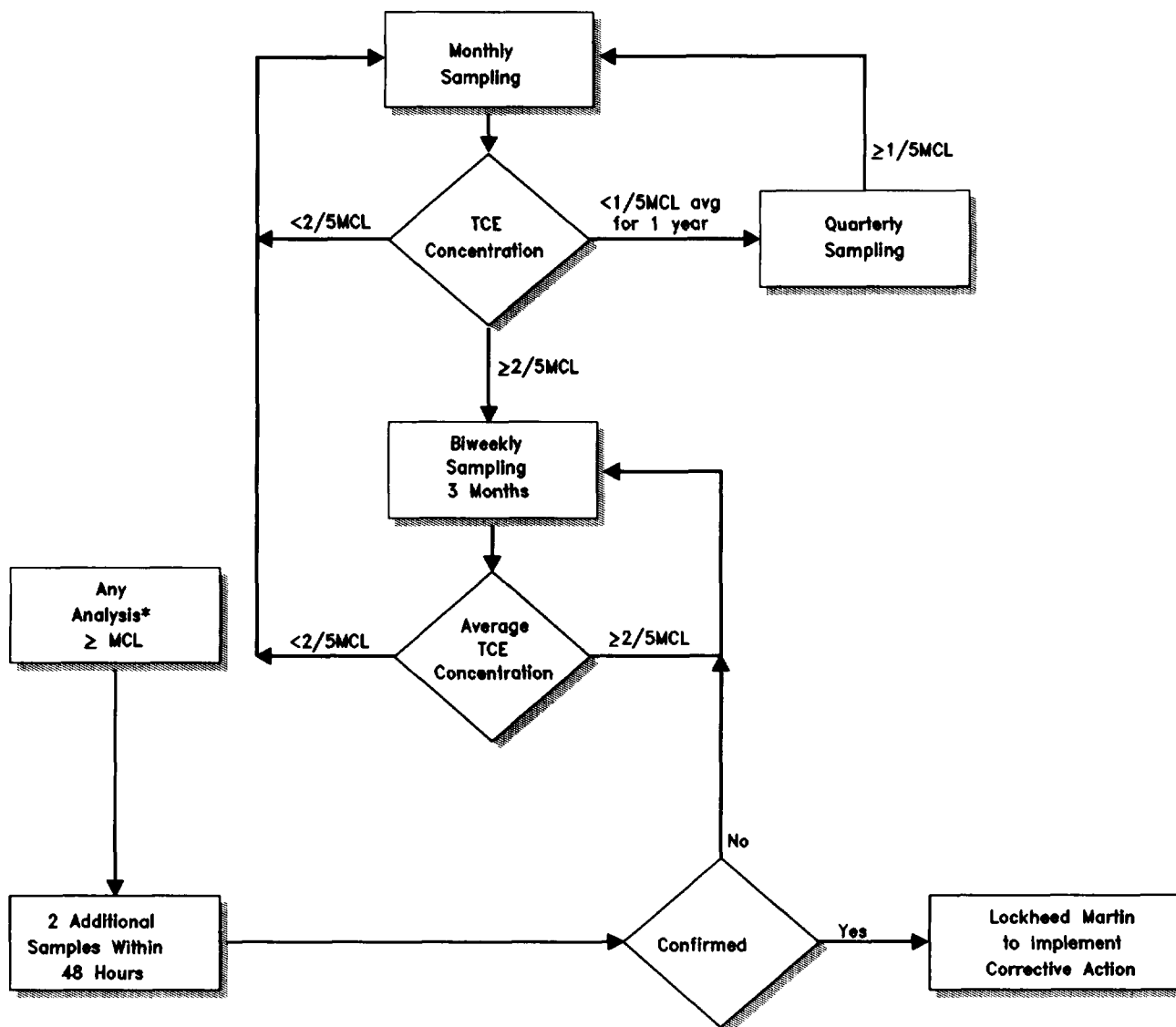


**HSI
GEOTRANS**
A TETRA TECH COMPANY

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DRAFTED: Hector Magaña
PROJ.: C541-101
DATE: 09/25/98

FIGURE:

3



Footnote:

* If, at a specific well, blending is occurring to provide acceptable water for compounds other than TCE, then no corrective action may be necessary as long as the concentration of TCE is less than 5.0 µg/L in the finished water.

TCE MCL = 5 µg/L (California Regulations, Title 22, Division 4, Chapter 15, Section 64444)

TITLE: Decision Matrix for Sampling of Production Wells for TCE from the Crafton-Redlands Plume
LOCATION: LOCKHEED MARTIN REDLANDS, CALIFORNIA



**HSI
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PROJ.:	C541-101
DATE:	09/25/98

FIGURE:

4

ATTACHMENT A
GEOLIS FIELD FORMS

ATTACHMENT A

GEOLIS FIELD FORMS
(Available Upon Request)

ATTACHMENT B

**CHAIN-OF-CUSTODY RECORDS AND
LABORATORY DATA SHEETS**

ATTACHMENT B

**CHAIN-OF-CUSTODY RECORDS AND
LABORATORY DATA SHEETS**
(Available Upon Request)

ATTACHMENT C

LEVEL III

QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION

ATTACHMENT C

LEVEL III

QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION

(Available Upon Request)